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Assessing and mapping biomass potential productivity from poplar-dominated riparian forests: A case study

Rosaria Cartisano [a], *Walter Mattioli* [a], *Piermaria Corona* [a], *Giuseppe Scarascia Mugnozza* [b], *Maurizio Sabatti* [a], *Barbara Ferrari* [a], *Dora Cimini* [a], *Diego Giuliarelli* [a,*]

[a] *Department for Innovation in Biological Agro-food and Forest Systems (DIBAF), University of Tuscia, Via San Camillo de Lellis, s.n.c., 01100 Viterbo, Italy*

[b] *Department of Agronomy, Forestry and Land Use (DAF), Agricultural Research Council (CRA), Rome, Italy*

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ABSTRACT

River systems are subjected to continuous physical changes as a result of their sediment transport. River dynamics is mainly determined by the seasonal variation of weather conditions and, together with the nature of the catchment and land management, affects flow patterns on a local scale. Riparian vegetation is well adapted to this periodical disturbance. It naturally regenerates on the new mineral soil created by the redistribution of river sediments during floods, playing an important role in the maintenance of streams and riverbanks stability. The high level of resilience and productivity of riparian tree species like *Populus*, contributes to the rapid biomass accumulation of riparian vegetation making these ecosystems of potential interest for biomass production for energy. This paper presents an operational methodology for investigating the biomass potential from riparian forests by coupling airborne laser scanning data and field survey. A case study on assessing and mapping biomass dynamics over a seventeen year period along a tract on the Paglia river, in Central Italy, is presented and discussed. The results highlight that the surface of the poplar-dominated riparian vegetation has significantly changed over the 1989–2006 period. More than 70 ha of new poplar forest were naturally regenerated during the analyzed period. The total amount of aboveground woody biomass of the riparian forest at the second inventory occasion has been estimated in 88 Mg ha^{-1}, evidencing a large amount of technically available resources for bioenergy production (around 80% of the standing woody biomass). The innovative strategy here proposed to assess and map at a very high spatial resolution the aboveground woody biomass of riparian forest meets the monitoring requirements to support energy production based on modern, non-conventional biomass harvest planning options.

1. Introduction

Natural river systems are dynamic bodies that continuously change as a result of their inherent physical conditions. Frequent disturbances like floods, caused by seasonal variation of weather conditions, affect flow patterns on a local scale originating a complex mosaic of landforms and biological communities [1,2], making rivers the most active component

* *Corresponding author*. Tel.: +39 (0)761 357417; fax: +39 (0)761 357389.
E-mail addresses: dgiuliarelli@unitus.it, dgiuliarelli@libero.it (D. Giuliarelli).

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